THE IMPACT OF INTEGRATION OF DENTAL SERVICES
ON ORAL HEALTH IN LONG-TERM CARE

by

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ABSTRACT

Background: There is no standardized approach to the organizational structure for oral health provision in long-term care (LTC) and many different arrangements exist within different institutions. Objectives: To analyze how integration of dental service in LTC impacts residents and their oral health using quantitative and qualitative research methods. Methods: A cross-sectional study was performed involving 61 residents in 3 LTC facilities in Ontario. Facility A had a fee-for-service hygienist, Facility B had a dentist present once per week, and Facility C had a full time dental team. Results: Dental services that initiated treatment as opposed to placing responsibility on the LTC resident to access dental care resulted in better oral health outcomes. Conclusion: Dental services in LTC require a proactive approach directly integrated with each resident’s overall health care plan. Passive treatment strategies fail to provide acceptable oral health for LTC residents even when dental services are available.
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REVIEW OF THE LITERATURE

Population Statistics of Long Term Care in Canada

In 2007, Canada had 4,546 long-term care (LTC) facilities helping 237,938 residents. 138,651 full-time LTC workers and 87,796 part-time workers received $9.3 billion in salaries. These facilities created $14.4 billion in revenues and $14.7 billion in expenses (1). Population projections from Statistics Canada predict that the number of beds in LTC facilities could rise from 187,300 in 1996/97 to greater than 565,000 in 2031 (2).

By 2026, population projections estimate the proportion of Canadians 65 years and older will double and the proportion of elderly over the age of 80 years will triple. This can be explained by the continued aging of the baby boomer generation and will result in the number of seniors aged 85 or older to increase from 800,000 to 2.5 million between 2021 and 2056 (3).

The baby boomer population typically tends to delay marriage and postpone having children. In addition, they have contributed to an increased number of women in the workforce. The projected rise in the number of elderly is concurrent with lower fertility rates of the younger populations. The net result is fewer adults to help take care of their older family members at a time when the patient-to-service provider ratio is increasing (4). This population is retaining more teeth than previous generations, they are living longer, and they will require even more demands from health and social services in order to maintain a reasonable quality of life (5).
**Systemic Conditions and Oral Health in LTC**

The mouth and oral pharynx contain an estimated total of $10^{14}$ microorganisms and over 300 cultivable species have been identified in the oral cavity (6). These microbes may enter the systemic system through bone, blood vessels, lymphatic vessels, or nervous tissue (7). Many LTC residents may also have changes to their intra-oral soft and hard tissues due to systemic disorders, medications, chemotherapy, and radiation treatment.

Oral Cancer rates nearly triple between the age groups 55 to 64 and 85 years and older (8). These changes may increase the risk of systemic complications caused by oral infection (9). The literature surrounding the relationship between oral health and systemic health generally implies an association. However, an infection anywhere in the body can affect systemic health and there is no reason to suggest that the oral cavity would be any different.

Pneumonia is the leading cause of death and the second most common cause of hospitalization for LTC residents (10). A reduced swallowing reflex, deceased lung capacity, and compromised host defenses can create an environment where oropharyngeal bacteria enter the lower respiratory tract with aspirated saliva. If host defenses cannot remove these pathogenic bacteria, then infection and tissue destruction develop. Co-morbidities that add to the risk of nosocomial pneumonia include cardiac disease, pulmonary disease, diabetes, neurological disorders, and malignancy (11). The risk of pneumonia can increase twenty fold in patients that require a ventilator to help
them breathe (12). Harkness et al, found that difficulty with oropharyngeal secretions and nasogastric intubation were the best predictors for nosocomial pneumonia (13).

Poor oral health may also be a risk factor for another respiratory infection, chronic obstructive pulmonary disease (COPD). Pathogenic bacteria in the oral cavity such as *P. gingivalis* and *F. nucleatum* can be aspirated into the lower respiratory tract causing initiation, propagation, or exacerbation of lung infections (14). Russel et al, found that poor oral hygiene and the presence of COPD may also be related to the colonization of known respiratory pathogens in dental plaque of chronic-care facility residents (15). Thus, dental plaque can contain oral bacteria that act as the etiologic agent in respiratory infection, but it may also serve as a reservoir for respiratory pathogens such as *P. aeruginosa* and enteric bacilli.

A bidirectional relationship has been shown between periodontal disease and diabetes with inflammation being the critical link between the two processes. Poorly controlled diabetes may increase risk for periodontal disease and periodontal disease may impair glycemic control in patients with diabetes (16). Therefore, reduction in periodontal inflammation may improve insulin sensitivity (17). The periodontium can act as a significant source of inflammation given the inflamed epithelial lining of periodontal pockets in a full dentition contains a potential surface area of 25cm². Cutaneous wounds of this magnitude would instigate prompt medical attention, but often go unnoticed in the oral cavity (6). Because periodontal disease is a chronic disease, the severity may progress as we age and the systemic impact may be greatest in older patients.
Chronic inflammation is also associated with increased cardiovascular and cerebrovascular disease. Increased systemic levels of c-reactive protein, fibrinogen, and cytokines have been causally linked to atherosclerosis-induced disease and associated with periodontal disease. In vitro and animal studies suggest that periodontal pathogens can induce platelet aggregation and there is conflicting evidence whether they invade vascular endothelium (18). Small sample sizes and retrospective analyses have also lead to confounding evidence between periodontal disease and stroke. However, Grau et al conducted a case-control study on 303 patients and found periodontal disease to be an independent risk factor ischemic stroke (19). In addition to chronic inflammation, oral infections of an acute nature requiring urgent treatment in frail elderly can lead to fatal consequences. A 5-year prospective cohort study involving ninety-four 85-year-old subjects determined that if a subject required urgent dental treatment, they had 3.9 times higher risk for death compared to subjects without this need (20).

**Ethical Dilemmas**

A concept that is fundamental to gerontology is that each person becomes more unique as they age (21). This creates highly specific treatment needs. Ethical dilemmas occur when a decision needs to be made while there is unresolved moral tension between different treatment options. There is a delicate balance between doing no harm, preventing harm, promoting good, and respecting an individual’s wishes. Bryant et al, investigated the views and experiences of dentists that worked with institutionalized elders to understand the influence of ethical problems encountered during treatment (22). Unclear treatment outcomes, patient wishes, and determinants of care often result in compromise treatment
decisions. Three common ethical dilemmas that arose for the dentists in the study occurred between patient autonomy-beneficence, nonmaleficence-beneficence, and nonmaleficence-autonomy. Opposing views were held between dentists regarding optimal treatment. This could range from ideal treatment taught in dental school to practical treatment given the circumstances surrounding each case.

Comfort and safety are important determinants of oral care near the final stages of life. Although these may seem like basic requirements, there are still conflicting views on treatment objectives that lead to misunderstandings within LTC facilities (23, 24). The impact of chronic diseases and frailty in institutionalized elderly may be used to unacceptably rationalize limited dental care. This can overlook the consequences of poor quality of treatment. Shay reports on dental management considerations for institutionalized elders and concludes that it is unethical to recommend inferior treatment plans based on beliefs that the patient can not afford appropriate treatment or because the care can not be carried out in the institution (25). The patient or guardian needs to be informed of all treatment options so that they can make an informed decision to manage the resident’s oral health. Furthermore, dental treatment should not be withheld unless extreme medical instability exists, the patient is in the terminal stages of life-threatening disease, or patient well-being will suffer due to the treatment. Major surgery on patients greater than 90 years of age reveals that properly managed care results in elders readily withstanding medical intervention (26). Benson et al, found that the severity of a LTC resident’s medical condition had no relation to their dental attitude or receptiveness for
treatment (27). The ethical dilemmas of dental care in LTC are only one component of many variables involved in providing oral care for this vulnerable population.

**Factors Influencing Oral Health in LTC**

There are many factors that influence the provision of oral care for LTC residents. In all societies, assistance for populations requiring help comes from family, community, the market, and government, but there is no agreement on how to divide up the responsibilities and financial requirements (28). To complicate matters, oral health is not a standard component of routine medical assessment for LTC residents. Health care providers report reasons such as; the oral cavity is not their responsibility, only dentists are responsible for oral health, or their patients are being seen by dentists (29).

**Nurses/Care Aids**

Questionnaires completed by 488 nurses aids that included 65 personal interviews investigated self-reported oral care activities on residents (30). Unfortunately, the nurse aids often placed oral care among the lowest priority within overcrowded daily routines. Lack of time, attitudes towards oral care, and behavioral and physical difficulties with residents affected quality of care. Rarely were nurse aids held responsible for failing to provide oral care (31).

Turn over of care-aids within facilities can be problematic for instilling a consistent oral hygiene program for residents. MacEntee et al, studied factors that influence oral health care in LTC within twelve facilities (32). Oral hygiene was a desired goal within
facilities, but no realistic method for accomplishing it could be identified (23). A novel technique used by one facility involved training six care-aids by a dental hygienist and designating them ‘oral care specialists’. This increased attention to oral hygiene above the previous report of “people with natural teeth not having any care (32).”

A study involving interviews of 22 nursing staff highlighted a common misconception regarding the cause of bleeding gums. Many nurses thought that traumatic tooth brushing was the cause of this bleeding and none could identify a preventive or therapeutic measure to reduce the bleeding (8). In general, a basic lack of knowledge was identified regarding oral health. Nurses thought that oral hygiene was more important for self-esteem and social concerns, as opposed to improvement of oral health.

**Doctors**

A small number of hospital doctors routinely check the oral cavity of older patients. This is a possible reflection of insufficient training in examining the mouth. 82 doctors in general and geriatric medicine were asked to diagnose oral mucosal conditions for 12 color slides and complete a questionnaire. 56% of doctors did not feel confident in examining the mouth and 77% felt they did not have proper training to perform an intra-oral examination (33). Most institutionalized residents are in regular contact with a doctor, but may not have a dentist. However, doctors often place oral health under the domain of dentistry and therefore, may not routinely examine the mouth. This combination of factors may leave an institutionalized resident with no oral assessment or an improper diagnosis for oral lesions.
Dentists

Numerous barriers to the provision of oral care in LTC have been cited in the literature. In 1992, a survey sent to dentists practicing in Vancouver looked at the dentists’ opinions on caring for LTC residents (34). In general, most dentists were not interested in providing this service due to interference with their daily practice, limited options available for treatment, inadequate space, lack of equipment, low financial return, and generally they felt inadequately prepared for the service.

Dentists must integrate a multitude of factors when determining the necessary dental care for LTC residents. These include patient desires and expectations, severity of dental need, impact on quality of life, probability of a positive outcome, treatment alternatives, ability to tolerate the stress of treatment, capability to maintain oral health, and financial resources (8). Integration of medical, psychosocial, and functional realms of care may require multidisciplinary assessment that includes information from a physician, dietitian, pharmacist, audiologist, swallowing therapist, occupational therapist, or physical therapist to finalize a treatment plan (25).

Historically, a large proportion of dentists felt inadequately trained or inexperienced to provide treatment to LTC residents (35). Improvements have occurred in the dental education curriculum for the elderly, however there is still a lack of competencies related to team based inter-professional care to produce the collaborative approach required for oral health care of the elderly (36).
University

In more recent years, dental programs have incorporated treatment of institutionalized older adults into their curriculums to better prepare dentists for this type of treatment. In 2002, The University of British Columbia’s Geriatric Dentistry Program (GDP) was set up to provide a comprehensive dental program for 900 LTC residents within 7 amalgamated Catholic hospitals known as Providence Health Care (PHC) in Vancouver. The program combined dental service, education, and research. Even though the GDP provided access to dental services for all PHC’s LTC residents, only one quarter of them received treatment and a third of the residents with an identified oral disorder were not recommended for treatment (24). A significant barrier to treatment was attaining consent from substitution decision makers, usually family members. A reported 40% did not respond after multiple mail and phone attempts. Finances were suspected to be a problem for residents on a fixed income. Small improvements in oral health for residents that utilized the GDP program were found in its first year of service.

Government

In Canada LTC facilities are not covered under the Canada Health Act. Provincial and territorial legislation govern LTC health policies, therefore different ranges of service are provided across the country.

In 1987 a statewide study in Colorado, USA was undertaken to review the levels of compliance of nursing homes with federal and state oral health regulations (37). These policies required a consulting dentist for each home, in-service oral health training for
staff, offering dental examinations for newly admitted residents, and having an oral hygiene policy. Results showed that compliance was quite high, however actual dental care was still a low priority. Less than 30% of the residents accepted the oral exam at admission. Government regulations often define minimum standards of care. Simply offering a dental exam does not result in it being given. Call et al, concluded that the dental profession and nursing homes go beyond a passive approach to treatment and strongly advocate for more complete dental care (37).

Access to Care

Access to medical care has different implications depending on how it is defined. In 1976 the United State 94th Congress, defined access as:

“an individual’s (or group’s) ability to obtain medical care. Access has geographic, financial, social, ethnic and psychic components and is thus very difficult to define and measure operationally…. Access is also a function of the availability of health services, and their acceptability. In practice access availability and acceptability, which collectively describe the things which determine the care people use, are very hard to differentiate (38).”

Bolden et al, utilizes the Institute of Medicine’s (IOM) definition of access and specifically applies it to oral health as, “the timely use of oral health services to achieve the best possible health outcome (39).” The IOM discusses three primary barriers to health care as structural, financial, and personal/cultural. Furthermore, access should not be measured by utilization of services.
Frequently, access to care is looked at in a simplistic fashion. For example, if the dental care is close by, or patients can get there easily, then more treatment needs would be met. This does not appear to be the case. A study done in Scotland assessed the provision of dental care for elderly at home and in LTC institutions. Even though 86% of dentists would perform home visits and 93% of the LTC homes provided transportation to dentists, only 25% of the residents had seen the dentist in the past year (40). No variance in treatment was noted with respect to frailty of the resident. Even when dentists and hygienists are available within a LTC home, residents can be unaware that the service is offered and staff may take on less responsibility assuming the dental professionals are responsible for all oral health. A better arrangement involves the dentists and hygienists being part of the health care team and included as participants in the care conferences that regularly assess each resident (41). Physical access to dental care may ease the treatment process, but many variables need to be in place for residents to use the available resources.

Financial Barriers

In general, as older adults retire they may lose insurance benefits and have a reduction in income. Financial constraints would appear to be a major limiting factor for nursing home residents that refuse care. However, LTC residents often refuse dental care even when financial barriers are removed. Benson et al demonstrated that one third of 133 residents in a Veterans Nursing Home refused treatment even though it would be completed at no fee (27). Patient decisions regarding treatment must be respected unless it involves a life-threatening decision or they are declared incompetent.
Psychological Factors

Older people often do not want to be a burden on their family and are averse to accepting help for matters they did not need help with in their younger years (28). Several studies have revealed that refusal of treatment is due to a perceived lack of treatment needs (42, 43). Additionally, residents tend to mask problems rather than admit to reliance on others (41). Psychological diseases such as dementia also complicate treatment decisions. Less educated and lower income LTC residents have been shown to have lower expectations with respect to overall health and especially dental health (44). Additionally, acceptance of chronic disease by many LTC residents may be thought as part of the aging process (45). Many residents may feel competent in performing oral hygiene, however loss in dexterity may compromise oral hygiene techniques. In 1994, Felder et al determined that assessing residents for decreased manual dexterity could help identify poor oral hygiene and difficulty with brushing (46).

Family

LTC resident’s family members are often substitute decision makers and determine what dental care the resident may receive. Warren et al, studied family member and guardian acceptance of dental services for LTC residents (47). Guardians often perceive the age of the resident, poor health status, and the resident’s reluctance for treatment as factors for not choosing dental services for the resident. The substitute decision makers that were younger, better educated, and thought dental treatment was required more often utilized the oral health services available.
There is often a shared responsibility between professionals and family for LTC residents, also known as formal versus informal care. In most families the responsibility for care usually falls under one person, such as a spouse or daughter. This usually consists of psychological support as opposed to hands-on care. Formal care is expected to rise due more informal care workers of the past entering the workforce today (4, 28).

**Study methods to assess oral health in LTC**

One of the challenges in determining which methods of oral health care work best in LTC is that no consensus has been reached on how to evaluate LTC oral health programs. Quantitative research methods have been used to measure causal relationships and to test the impact of specific interventions with factual data. On the other hand, qualitative methods aim to discover and interpret complex variables within multifaceted social environments to generate detailed data that includes participants’ perspectives (48). When combined, both research methods compensate for the weaknesses of the other (49).

Many studies aimed at disease prevention have involved educational interventions, but have been limited by uncertainty about the clinical measures for assessing appropriate levels of oral hygiene and comfort. Numerous indices have been developed to assess oral health in LTC, but they have not been proven as predictors for oral health (31). Beck has noted that in prevalence studies, the association of the presence or absence of dental conditions may reflect conditions that occurred over many years. These conditions could have occurred before the patient entered the LTC facility (50). Examiner calibration,
standardization, and appropriate sampling are rarely properly addressed (51). Inherently, the LTC environment is challenging to conduct research in.

MacEntee et al have found the analysis of responses from structured questionnaires to evaluate oral health related behaviors and beliefs in LTC unsuccessful at explaining the differences in responses. As a result, this study group used a qualitative case study research design. This included open-ended interviews designed to understand LTC residents, administrators, staff, families, physicians, and dental personnel’s perceptions related to the impact of oral health care programs on the residents of LTC facilities (32). Inductive analytical techniques were used to identify idioms, psychosocial patterns, categories, and themes within transcribed interview data (52). A 2007 literature review by the same research group provided further insight into methods for assessing the quality of oral healthcare in LTC. The final recommendation was “a ‘structure-process-outcome’ framework with a focus on formative and summative evaluations (that) should engage all of the participants, and provide both quantitative and qualitative evidence of success (53).”

The utilization of patient questionnaires to screen for dental needs may be unwarranted. A 2008 pilot study was performed in the United Kingdom assessing the viability of a questionnaire based assessment tool to screen for dental needs involving frail adults in LTC. The proportion of residents not requiring treatment was so low that utilizing a questionnaire based screening tool was unnecessary (54).
**Oral Health in LTC**

Older adults are retaining more teeth; therefore the rate of edentulism is declining. There will be increased demands on oral health care providers due to new patterns of disease (36). Numerous studies have reported dental needs among the elderly to be high with a reported 70%-87% requiring treatment (55-57). This majority of this treatment involves extraction, restorative, and prosthetic services.

MacEntee et al (1987), investigated the oral health needs and demands of 653 LTC residents (35). 60% of residents were edentulous and they rarely sought dental treatment. Two thirds said that they did not have anything wrong with their oral health. The most common complaints were loose or uncomfortable dentures and dissatisfaction with previous dental treatment. Dental examination commonly found poor oral hygiene, defective dentures, and deep carious lesions. Although most residents did not demand care, oral health problems were present that were not receiving care. Berkley et al also found that LTC residents’ tend to under report symptoms related to oral health problems (8).

Logistically, it would appear that LTC facilities with greater access to care would have residents with less treatment needs. However, a study involving 12 different LTC facilities with different strategies for delivering oral health services did not find a remarkable difference in the distribution of oral disorders between facilities. Effective strategies for providing care are more complex than just providing on-site dental services (32). In general, dental emergencies are handled well in LTC (23).
**Strategies to Improve Oral Health in LTC**

Key strategies for successful oral health care in LTC include a formalized routine for oral examinations and oral hygiene along with easy access to dentists, dental hygienists, and denturists (35). Incorporating these routines involves interdisciplinary co-operation in a complex environment. Guay reports a triad of essential factors in order to solve oral health access for underserved populations (58). First, there must be a demand for dental care and this must be differentiated from a need for dental care. Educating residents, families, care providers, and administrators may be effective for increasing the demand for dental care where dental needs are high. Second, the dental workforce should be sufficient in size to meet the demand for care. The current workforce may appear poorly distributed relative to dental needs, but it is a normal distribution relative to the demand for care. Third, the economic environment must properly compensate dentists and care aids to participate in providing care. Poor re-imbursement to health care providers discourages access to care. Solutions that involve changing a single factor do not usually provide positive long-term results.

Hybrid models in the medical community address health care disparities by integrating clinical and community approaches to improve health (59). Clinically centered hybrid approaches invite the community, public health, policy, and research experts into the clinical environment to make interventions more responsive and effective. This concept is designed to address the biological and social determinants of health. Oral health in LTC requires following such an approach. Volunteer senior mentors that can help other
seniors with health care information, advice, and counseling may be an effective model to increase health knowledge and behavior modification (60).

Dental care for elderly LTC residents is often looked at as an extension of the basic dental education provided on younger adults. University programs are becoming stronger in this area by incorporating externships to LTC facilities. However, dental education needs to incorporate the social, biological, emotional, political, and economic aspects of the aging process (61).

The CDA is taking action to improve the disparities in oral health for the elderly with the creation of a National Seniors’ Task Force. Each province is contributing its own research and solutions to improving oral health in LTC. The Santa Maria Seniors Oral Services (S.O.S) Pilot Project in Saskatchewan is an example of current research for development of standards and guidelines to improve the oral health of LTC residents that reflects the diversity of their physical, financial, and psychological conditions (36). This project includes provincial legislation to create a seniors oral health program that includes five main components. These include standardized oral assessment tools and oral care requirements, a formalized routine for oral examination, education, training, and access to dental care providers. Specific attention is given to public awareness, effective delivery of service, minimum care standards, and evidence-based regulations.
INTRODUCTION AND STATEMENT OF THE PROBLEM

Oral health in LTC is a challenging community health issue. Research has demonstrated that a high percentage of residents in LTC perceive themselves as having fair to poor oral health and have problems with eating and communicating (11, 12). Poor oral health is often exacerbated by common conditions in LTC residents such as xerostomia and dysphagia. Oral inflammation, infection, and pathogenic bacteria can negatively impact systemic disease and poor systemic health may make proper oral health difficult to achieve (6-17). The number of beds in LTC are rising at a rapid rate due to the continued aging of the baby boomer population in conjunction with the lower fertility rates of younger populations (2). Quantitative data alone, often derived from structured questionnaires, has not been able to explain the wide variance in oral health seen in LTC. Recently, qualitative research has resulted in a clearer understanding of human behavior demonstrated by LTC residents (32).

The aim of this study is to combine quantitative and qualitative research methods to understand the impact of different approaches to dental provision in LTC. The hypothesis is LTC facilities that promote oral health through accessible dental care and a proactive approach result in better oral health for residents. The objectives were:

1. To determine how dental service provision in LTC facilities affects the oral health of residents.

2. To qualitatively analyze how integration of dental service in LTC impacts residents and their oral health.
REFERENCES


27. Benson BH, Niessen LC, Toga CJ. Dental treatment and demand for services in a Veterans Administration Nursing Home Care Unit. J Public Health Dent. 1984 Fall;44(4):147-55.


44. Kiyak HA, Reichmuth M. Barriers to and enablers of older adults' use of dental services. J Dent Educ. 2005 Sep;69(9):975-86.


TITLE OF ARTICLE

The Impact of Integration of Dental Services on Oral Health in Long-Term Care. Part 1: Quantitative Analysis.

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ABSTRACT

Objectives: To determine how dental service provision in long-term care (LTC) facilities affects the oral health of residents.

Background: LTC residents are susceptible to systemic diseases that have been linked to oral diseases, including aspiration pneumonia, diabetes, cerebrovascular and cardiovascular diseases. Perceptions of need for dental care, tolerance of dental treatment, and adaptation to deteriorating oral health have all become significant factors for LTC residents. There is no standardized approach to the organizational structure for oral health provision in LTC and many different arrangements exist within different institutions.

Materials and methods: A cross-sectional study was performed involving 61 residents in 3 LTC facilities in Ontario each with a unique method for provision of dental care. Facility A had a fee-for-service hygienist that attended patients at their request, Facility B had a dentist present once per week who was available at the patients’ request, and Facility C had a full time dental team where all patients underwent dental screenings. Comprehensive dental examinations were recorded and treatment needs were classified according to the American Dental Association (ADA) hierarchy model. Qualitative and quantitative data were collected.

Results: Dental services that initiated treatment as opposed to placing responsibility on the LTC resident to access dental care resulted in better oral health outcomes. Facility C, which advocated and scheduled entrance and recall oral examinations, had the best ADA
classification results with only 25% of residents requiring early or emergency treatment. Facilities A and B required that the resident, resident’s family, or staff initiate a dental consultation. This approach resulted in 42% of Facility A residents and 75% of Facility B residents requiring early or emergency treatment. Facilities A and C did not differ in terms of mean Visual Analog Scale (VAS) scores for mouth pain and dryness which were significantly lower than those in Facility B.

**Conclusion:** Dental services in LTC require a proactive approach directly integrated with each resident’s overall health care plan. Passive treatment strategies fail to provide acceptable oral health for LTC residents even when dental services are available. Oral health promotion for LTC requires a collaborative approach that addresses the biologic and social factors integral to providing treatment.
INTRODUCTION

Recent population projections from Statistics Canada predict that the number of beds in long-term care facilities could rise from 187,300 in 1996/97 to greater than 565,000 in 2031(1). The baby boomer generation is retaining more teeth than previous generations, they are living longer, and they will place even more demands on health and social services in order to maintain a reasonable quality of life (2).

LTC residents are susceptible to systemic diseases that have been linked to oral diseases, including aspiration pneumonia, diabetes, cerebrovascular and cardiovascular diseases (3-6). Pneumonia is the most lethal infection in nursing home residents with mortality between 5% and 40% (5). Diet, nutrition, sleep, psychological status, and social interaction are all affected by impaired oral health (7). Acute oral infections in frail elderly patients must be treated as soon as possible in order to avoid potentially severe health consequences (8). Daily oral hygiene practice and regular dental care are cost-effective means for reducing the morbidity of oral infections and their non-oral sequelae (9).

Numerous studies have reported the dental needs among the elderly to be high with 70%-80% requiring treatment (10). In a study of older adults in Toronto, 37.7% of respondents aged 65-74 had problems eating and communicating as a result of their oral health status (11). A 2001 Ontario study completed on 275 long-term care residents in three Durham homes found that 44% of the participants perceived themselves as having
fair to poor oral health. In general, LTC residents tend to under report symptoms related to oral health (12).

Perceptions of need for dental care, tolerance of dental treatment, and adaptation to deteriorating oral health have all become significant factors for LTC residents. Recent Canadian research has shown that quantitative methods alone may fail to bring an understanding to the variance in oral health data previously collected (13). There is presently no standardized approach to the provision of oral health in LTC. Many different oral health care arrangements exist within LTC institutions with varying levels of success in reducing treatment needs. Our goal was to determine if the mechanisms through which LTC patients initiate oral health provision impacts on overall oral health for patients in LTC.
MATERIALS AND METHODS

Institution and level of care

Data were collected from three LTC centers that differed with respect to the level of dental care available. In Facility C, the dentists and hygienists were paid by salary and took a proactive approach to treatment (Table I). Residents arranged screening appointments once entering the facility. The average patient received approximately six hygienist visits per year. The dental team took care of any dental emergencies, arranged recall examinations, and organized payment plans for patients with financial disparity. Oral care was integrated into the general health care of each patient.

Facility A had a hygienist that visited every six weeks and Facility B had a dentist that visited once per week. In both facilities, treatment was optional, approached in a passive manner, and provided on a fee-for-service basis. Oral care was not incorporated into the general health care of residents in these facilities.

The principal examiner collected data on each participant from four sources. These included a comprehensive oral exam, the patient chart, a questionnaire, and a patient interview. Ethics approval was obtained from the University of Toronto and the three facilities included in this study.

Dental, nursing, or administrative staff identified patients eligible for participation. Written informed consent was obtained from the resident or substitute decision maker. A
nurse or care-aid acted as a liaison and assisted with data transcription. The resident’s medical chart was reviewed to ensure their suitability for oral examination.

A standardized questionnaire was conducted prior to the oral examination (2, 14, 15). Information was collected regarding general health, source of income, education, reason for admission, dental history, level of mobility, chewing ability, pain, xerostomia, oral hygiene, smoking, denture care, and dental insurance coverage. This questionnaire was designed to identify potential contributing factors to the residents’ current state of oral health.

The same examiner (GF) completed extra-oral and intra-oral examinations for all patients using a surgical headlamp and two times magnification loupes. All pathology was recorded. The intra-oral examination included measurements of gingival index, plaque index, bleeding on probing, mobility, furcation involvement, periodontal probing, attachment levels, missing teeth, caries, restorations, percussion sensitivity, and denture assessment. Results of the examination were summarized according to the ADA classification of treatment needs as summarized in Table II (16). Representative photographs of the patient’s oral condition were taken for future reference.

The data collected were both qualitative and quantitative in nature. Open-ended conversations with residents were undertaken and discussion points pertaining to oral health were noted. This paper focuses on the qualitative data, whereas the qualitative data is presented in part two of this series.
Exclusion criteria

Resident’s were excluded if their medical condition precluded completion of an oral examination. This included patients that could not keep their mouth open for an oral examination.

Statistical Analysis

Data analysis was completed using SPSS computer software to examine the relationships between the oral health of the residents and their respective LTC facility. The main outcome was the ADA classification and the main explanatory variable was the facility. The analyses used the Pearson Chi-square test for categorical variables and one-way ANOVA and the Duncan multiple range tests for continuous variables. The relationship between ADA classification (dichotomized 1+2 vs 3+4) and facility was investigated using logistic regression to account for potential confounders. To adjust for the potential confounding effects of other variables on the relationship between the visual analogue scale (VAS) for pain and LTC facility, multiple regression was used. Statistical tests were interpreted at the 5% significance level (two-tailed tests).
RESULTS

Resident characteristics

Sixty-one residents consisting of 31 females and 30 males took part in the study (Table III). The difference in the age of the residents was statistically significant between the three facilities. Eighty-six percent of residents in Facility A were over the age of 75 years. Facility B residents were mostly between 50 and 74 years old, while Facility C had 75% of residents between 29 and 64 years old.

The median number of teeth within the study group was 21. Facility C residents had the highest number of teeth, likely due to their overall younger age of the group. Similarly, Facility A had the most edentulous residents as would be expected due to the older age of the group. Many residents were previous smokers, but the overall trend showed most residents stop smoking once living in institutionalized care (Table III).

With an alpha level of ≤.05, the distribution of dental insurance was statistically significant between the three sites. 75% of Facility C residents, 38% of Facility A residents, and 44% of Facility B had partial or complete dental insurance coverage (Table IV). Regardless of dental insurance, most residents at all the facilities reported the ability to cover dental expenses. Education levels and types of occupation were fairly consistent between the sites.

All Facility C residents required a wheelchair for mobility. Facility B had the highest proportion of bedridden residents compared to the other two sites (Table V). There did
not appear to be a statistically significant difference in limitation of manual dexterity or upper mobility between the sites.

The requirement for help with brushing and/or flossing reached a statistically significant difference between the three facilities (Table VI). Facility C showed a trend towards needing the most help in this area with half of the residents requiring help with brushing or flossing. This facility was the only one to have a full time dental team available, yet the nurses provided this care almost all the time. Facility B residents did not need as much help in this area, yet residents often had to rely on family, friends, or health care aids for this treatment. Overall, flossing was not part of the routine care for roughly 80% percent of all residents, however tooth brushing was reported by 80% of the residents once or twice a day. A statistically significant difference for time elapsed since the last professional teeth cleaning was evident between the sites. Facility C had the best results in this area as all the residents received a professional cleaning within the past year.

There was no statistically significant difference between the resident’s self reported overall health or dental health between the three sites (Table VII). Facility B suggests a trend towards more residents reporting fair or poor overall health and dental health. Chi-squared tests reached statistical significance between the facilities for how often they saw the dentist and similarly the time since they last visited the dentist. A higher proportion of residents in facility A and B only saw the dentist when they were having pain or trouble with almost half of each of these facility’s residents falling into this category.
Facility A, which had the least access to dental care, had the most residents that did not see a dentist in longer than one year.

There was a trend towards increased chewing disability at Facility B, however statistical significance was not reached (Table VIII). The other sites showed a more positive chewing index leaning in the direction of chewing competence. Residents at the various sites differed in their reported satisfaction with the appearance of their teeth. Almost all the residents in Facilities A and C were satisfied with the appearance of their teeth (Table VIII). This was in contrast to Facility B, which showed that almost half of its residents were dissatisfied with the appearance of their teeth.

**Oral Health According to Facilities**

Residents in the three facilities differed significantly with regards to the ADA classification of treatment needs (Table IX). Three-quarters of the residents in Facility B required early or emergency treatment, while only 25% of the residents within Facility C needed such treatment despite the fact that residents in Facility C had been in LTC for a greater time period than either of the other facilities. Facility A ranked between the other two facilities. These differences were statistically highly significant, however once adjustment was made for confounders (age, gender, number of teeth, time in LTC, smoking, limited manual dexterity, requires help brushing/flossing, chewing index, dental insurance, # of sources of income, education), the difference among the facilities were no longer statistically significant. In fact, the more income sources the more likely the resident classification was 1 and 2.
The plaque index was significantly different between the facilities with facility C demonstrating the lowest average PI per site assessed (Table X). However, a high degree of variability still exists for this estimate (SD 0.76). Other oral hygiene indicators did not reach a level of statistical significance between the three facilities.

Visual analogue scales for mouth pain and dryness were assessed (Table XI). With an alpha level of ≤.05, statistical significance was reached for a difference among the three facilities for current mouth pain and mouth dryness. Facility B showed higher levels of current pain and dryness compared to the other facilities. These results should be interpreted with caution because there were other factors confounding the relationship between the VAS scores and type of facility. For example, the resident’s inability to chew was the most important factor related to mouth pain as determined from multiple regression.
Table I  Description of Each Long-Term Care Facility According to the Implementation of Dental Services

<table>
<thead>
<tr>
<th>Item</th>
<th>Facility A</th>
<th>Facility B</th>
<th>Facility C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Resident</td>
<td>Long-term care</td>
<td>Complex continuing care/Long-term care</td>
<td>Complex continuing care</td>
</tr>
<tr>
<td>On-Site Care</td>
<td>Hygienist once every 6 weeks</td>
<td>Dentist once/week</td>
<td>Dentist, Hygienist Full Time</td>
</tr>
<tr>
<td>Entrance Oral Exam</td>
<td>Optional</td>
<td>Optional</td>
<td>Advocated and Scheduled</td>
</tr>
<tr>
<td>Re-evaluation</td>
<td>Optional</td>
<td>Optional</td>
<td>Scheduled</td>
</tr>
<tr>
<td>Dental Emergency Identification</td>
<td>Resident, Family, Staff</td>
<td>Resident, Family, Staff</td>
<td>Resident, Family, Staff</td>
</tr>
<tr>
<td>Resident with No Resources</td>
<td>Reserve Funding</td>
<td>Pro Bono by Dentist</td>
<td>Pro Bono by Dentist</td>
</tr>
<tr>
<td>Dentist, Hygienist Income</td>
<td>Fee-for-service</td>
<td>Fee-for-service</td>
<td>Salaried</td>
</tr>
<tr>
<td>Overall Treatment Approach</td>
<td>Passive</td>
<td>Passive</td>
<td>Proactive</td>
</tr>
<tr>
<td>Class</td>
<td>Treatment Required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Individuals requiring no dental treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Individuals requiring treatment but not of an urgent nature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Moderate calculus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Prosthetic cases not included in class 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Caries – not extensive or advanced</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Periodontal diseases – not extensive or advanced</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Other oral conditions requiring corrective or preventive measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Individuals requiring early treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Extensive or advanced caries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Extensive or advanced periodontal disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Chronic pulpal or apical infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Chronic oral infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Heavy calculus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. Surgical procedures required for removal of one or more teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and other surgical procedures not included in class 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. Insufficient number of teeth for mastication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Individuals requiring emergency dental treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Injuries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Acute oral infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Painful conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Any oral condition which can jeopardize the health or safety</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Classification was based on complete periodontal examination under 2.0× magnification with headlamp. Intra-oral photos were taken when possible. No radiographic assessment was used.
<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n=21</td>
<td>n=20</td>
<td>n=20</td>
<td></td>
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<tr>
<td>Gender</td>
<td>Female</td>
<td>9 (43)</td>
<td>13 (65)</td>
<td>9 (45)</td>
<td>.299</td>
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<tr>
<td></td>
<td>Male</td>
<td>12 (57)</td>
<td>7 (35)</td>
<td>11 (55)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>75+</td>
<td>18 (86)</td>
<td>8 (40)</td>
<td>1 (5)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>65-74</td>
<td>1 (5)</td>
<td>6 (30)</td>
<td>3 (15)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-64</td>
<td>2 (10)</td>
<td>6 (30)</td>
<td>7 (35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29-49</td>
<td>0</td>
<td>0</td>
<td>9 (45)</td>
<td></td>
</tr>
<tr>
<td>Number of teeth</td>
<td>&gt; Median (21 teeth)</td>
<td>8 (38)</td>
<td>6 (30)</td>
<td>16 (80)</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>≤ Median (21 teeth)</td>
<td>13 (62)</td>
<td>14 (70)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td>Edentulous</td>
<td>No (≥ one tooth)</td>
<td>14 (67)</td>
<td>17 (85)</td>
<td>20 (100)</td>
<td>.015</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>7 (33)</td>
<td>3 (15)</td>
<td>0</td>
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</tr>
<tr>
<td>Time in LTC</td>
<td>≤ 2 years</td>
<td>16 (76)</td>
<td>15 (75)</td>
<td>7 (35)</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>≥ 3 years</td>
<td>5 (24)</td>
<td>5 (25)</td>
<td>13 (65)</td>
<td></td>
</tr>
<tr>
<td>CUD</td>
<td>Yes</td>
<td>9 (43)</td>
<td>5 (25)</td>
<td>0</td>
<td>.005</td>
</tr>
<tr>
<td>CUD and CLD</td>
<td>Yes</td>
<td>6 (29)</td>
<td>2 (10)</td>
<td>0</td>
<td>.022</td>
</tr>
<tr>
<td>Non smoker</td>
<td>Yes</td>
<td>21 (100)</td>
<td>19 (95)</td>
<td>17 (85)</td>
<td>.144</td>
</tr>
<tr>
<td>Previous smoker</td>
<td>Yes</td>
<td>9 (42.9)</td>
<td>11 (58)</td>
<td>5 (29)</td>
<td>.227</td>
</tr>
</tbody>
</table>

* - obtained from $\chi^2$ test
CUD – complete upper denture
CLD – complete lower denture
<table>
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<tr>
<th></th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dental insurance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>none</td>
<td>13 (62)</td>
<td>10 (56)</td>
<td>5 (25)</td>
<td>.043</td>
</tr>
<tr>
<td>part/all</td>
<td>8 (38)</td>
<td>8 (44)</td>
<td>15 (75)</td>
<td></td>
</tr>
<tr>
<td><strong>able to cover expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>17 (85)</td>
<td>17 (90)</td>
<td>17 (85)</td>
<td>.896</td>
</tr>
<tr>
<td>part/none</td>
<td>3 (15)</td>
<td>2 (11)</td>
<td>3 (15)</td>
<td></td>
</tr>
<tr>
<td>education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>highscool or less</td>
<td>10 (48)</td>
<td>11 (55)</td>
<td>10 (50)</td>
<td>.891</td>
</tr>
<tr>
<td>&gt; highschool</td>
<td>11 (52)</td>
<td>9 (45)</td>
<td>10 (50)</td>
<td></td>
</tr>
<tr>
<td><strong># sources of income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ two income sources</td>
<td>6 (29)</td>
<td>17 (85)</td>
<td>16 (80)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>≥ three income sources</td>
<td>15 (71)</td>
<td>3 (15)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td>occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ managerial</td>
<td>14 (67)</td>
<td>10 (50)</td>
<td>8 (40)</td>
<td>.224</td>
</tr>
<tr>
<td>≤ manual labour</td>
<td>7 (33)</td>
<td>10 (50)</td>
<td>12 (60)</td>
<td></td>
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</table>

* - obtained from χ² test, 2df
<table>
<thead>
<tr>
<th></th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ambulatory</td>
<td>no</td>
<td>10 (48)</td>
<td>15 (75)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>bedridden</td>
<td>yes</td>
<td>0</td>
<td>4 (20)</td>
<td>0</td>
</tr>
<tr>
<td>wheelchair</td>
<td>yes</td>
<td>10 (48)</td>
<td>14 (70)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>lim of upper mobility</td>
<td>yes</td>
<td>12 (57)</td>
<td>10 (50)</td>
<td>11 (55)</td>
</tr>
<tr>
<td>lim of manual dexterity</td>
<td>yes</td>
<td>10 (48)</td>
<td>11 (55)</td>
<td>15 (75)</td>
</tr>
</tbody>
</table>

* - Obtained from \( \chi^2 \) test
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires help brushing/flossing</td>
<td>Yes</td>
<td>3 (14)</td>
<td>6 (30)</td>
<td>10 (50)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>18 (86)</td>
<td>14 (70)</td>
<td>10 (50)</td>
</tr>
<tr>
<td>Who helps brush/floss</td>
<td>Nurse</td>
<td>2 (67)</td>
<td>3 (50)</td>
<td>9 (90)</td>
</tr>
<tr>
<td></td>
<td>family, friend, HCA, other</td>
<td>1 (33)</td>
<td>3 (50)</td>
<td>1 (10)</td>
</tr>
<tr>
<td>If can’t do OH, is help available</td>
<td>Always</td>
<td>3 (100)</td>
<td>3 (60)</td>
<td>6 (67)</td>
</tr>
<tr>
<td></td>
<td>occas, rarely, never</td>
<td>0</td>
<td>2 (40)</td>
<td>3 (33)</td>
</tr>
<tr>
<td>Frequency of brushing teeth</td>
<td>once/twice day</td>
<td>12 (86)</td>
<td>12 (71)</td>
<td>19 (95)</td>
</tr>
<tr>
<td></td>
<td>a few times/week or less</td>
<td>2 (14)</td>
<td>5 (30)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Frequency of flossing teeth</td>
<td>once/twice day, few times/week</td>
<td>4 (29)</td>
<td>3 (20)</td>
<td>3 (15)</td>
</tr>
<tr>
<td></td>
<td>once/week or less</td>
<td>10 (71)</td>
<td>12 (80)</td>
<td>17 (85)</td>
</tr>
<tr>
<td>How often do you or an aid clean denture(s)</td>
<td>once/twice day</td>
<td>9 (90)</td>
<td>7 (70)</td>
<td>1 (50)</td>
</tr>
<tr>
<td></td>
<td>a few times/week or less</td>
<td>1 (10)</td>
<td>3 (3)</td>
<td>1 (50)</td>
</tr>
<tr>
<td>Remove denture(s) at night</td>
<td>everynight</td>
<td>8 (80)</td>
<td>6 (60)</td>
<td>2 (100)</td>
</tr>
<tr>
<td></td>
<td>several times a week or less</td>
<td>2 (20)</td>
<td>4 (40)</td>
<td>0</td>
</tr>
<tr>
<td>Time since last professional teeth cleaning</td>
<td>≤ past year</td>
<td>9 (64)</td>
<td>8 (47)</td>
<td>20 (100)</td>
</tr>
<tr>
<td></td>
<td>&gt; 1 year</td>
<td>5 (36)</td>
<td>9 (53)</td>
<td>0</td>
</tr>
</tbody>
</table>

* - obtained from $\chi^2$ test
HCA – Health Care Aid
## Table VII  Resident’s Self Reported Overall Health and Dental Health by Long-Term Care Facility

<table>
<thead>
<tr>
<th></th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>excellent, very good, good</td>
<td>16 (76)</td>
<td>12 (60)</td>
<td>14 (70)</td>
<td>.530</td>
</tr>
<tr>
<td>fair, poor</td>
<td>5 (24)</td>
<td>8 (40)</td>
<td>6 (30)</td>
<td></td>
</tr>
<tr>
<td><strong>Dental health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>excellent, very good, good</td>
<td>16 (76)</td>
<td>11 (58)</td>
<td>16 (80)</td>
<td>.263</td>
</tr>
<tr>
<td>fair, poor</td>
<td>5 (24)</td>
<td>8 (42)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td><strong>How often see dentist</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>reg, time to time</td>
<td>11 (52)</td>
<td>11 (55)</td>
<td>20 (100)</td>
<td>.001</td>
</tr>
<tr>
<td>pain/trouble, never</td>
<td>10 (48)</td>
<td>9 (45)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Time since last visited dentist</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1 year</td>
<td>8 (38)</td>
<td>12 (60)</td>
<td>20 (100)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>13 (62)</td>
<td>8 (40)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Do you feel currently need tx</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>5 (24)</td>
<td>10 (50)</td>
<td>5 (25)</td>
<td>.097</td>
</tr>
<tr>
<td>no</td>
<td>16 (76)</td>
<td>10 (50)</td>
<td>15 (75)</td>
<td></td>
</tr>
</tbody>
</table>

* - obtained from $\chi^2$ test
<table>
<thead>
<tr>
<th>Satisfaction with Chewing and Appearance by Long-Term Care Facility</th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>chewing index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chewing competence</td>
<td>14 (67)</td>
<td>9 (47)</td>
<td>16 (80)</td>
<td>.100</td>
</tr>
<tr>
<td>chewing disability</td>
<td>7 (33)</td>
<td>10 (53)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td><strong>satisfaction with ability to chew</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>satis/very satis</td>
<td>20 (95)</td>
<td>17 (90)</td>
<td>18 (90)</td>
<td>.762</td>
</tr>
<tr>
<td>dissatisfied/very dissatisfied</td>
<td>1 (5)</td>
<td>2 (11)</td>
<td>2 (10)</td>
<td></td>
</tr>
<tr>
<td><strong>satisfaction with appearance of teeth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>satis/very satis</td>
<td>21 (100)</td>
<td>10 (53)</td>
<td>17 (90)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>dissatisfied/very dissatisfied</td>
<td>0</td>
<td>9 (47)</td>
<td>2 (10)</td>
<td></td>
</tr>
</tbody>
</table>

* - obtained from $\chi^2$ test
Table IX  Distribution of Residents by American Dental Association (ADA) Classification and Long-Term Care Facility

<table>
<thead>
<tr>
<th>ADA Class</th>
<th>Facility A (%)</th>
<th>Facility B (%)</th>
<th>Facility C (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 (24)</td>
<td>1 (5)</td>
<td>6 (30)</td>
<td>0.032*</td>
</tr>
<tr>
<td>2</td>
<td>7 (33)</td>
<td>4 (20)</td>
<td>9 (45)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8 (38)</td>
<td>9 (45)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 (5)</td>
<td>6 (30)</td>
<td>1 (5)</td>
<td></td>
</tr>
<tr>
<td>1+2</td>
<td>12 (57)</td>
<td>5 (25)</td>
<td>15 (75)</td>
<td>0.006**</td>
</tr>
<tr>
<td>3+4</td>
<td>9 (42)</td>
<td>15 (75)</td>
<td>5 (25)</td>
<td>0.396***</td>
</tr>
</tbody>
</table>

* $\chi^2$ test, 6 df
** $\chi^2$ test, 2 df
*** Logistic regression adjusting for: Age, gender, number of teeth, time in LTC, smoking, limited manual dexterity, requires help brushing/flossing, chewing index, dental insurance, # of sources of income, education.
### Table X: Oral Hygiene Indicators for Dentate Residents by Facility

<table>
<thead>
<tr>
<th></th>
<th>Facility A</th>
<th>Facility B</th>
<th>Facility C</th>
<th>( p )-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average GI site</strong></td>
<td></td>
<td></td>
<td></td>
<td>.340</td>
</tr>
<tr>
<td>N</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.22(^a)</td>
<td>1.27(^a)</td>
<td>1.01(^a)</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>0.46</td>
<td>0.52</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Std. Error</td>
<td>0.13</td>
<td>0.13</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td><strong>Average PI per site</strong></td>
<td></td>
<td></td>
<td></td>
<td>.038</td>
</tr>
<tr>
<td>N</td>
<td>14</td>
<td>17</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.93(^a)</td>
<td>1.98(^a)</td>
<td>1.41(^b)</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>0.70</td>
<td>0.69</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Std. Error</td>
<td>0.19</td>
<td>0.17</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td><strong>Percent site BOP</strong></td>
<td></td>
<td></td>
<td></td>
<td>.912</td>
</tr>
<tr>
<td>N</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.79(^a)</td>
<td>20.00(^a)</td>
<td>22.26(^a)</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>15.80</td>
<td>14.73</td>
<td>16.02</td>
<td></td>
</tr>
<tr>
<td>Std. Error</td>
<td>4.56</td>
<td>3.57</td>
<td>3.89</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Obtained from one-way ANOVA. Duncan test means with the same superscript letter are not significantly different at the 5% level.

GI – gingival index
PI – plaque index
BOP – bleeding on probing

4/51 dentate residents required antibiotic prophylaxis and could not be probed
1/51 dentate residents could not be probed due to high INR
**Table XI** Mean Visual Analog Scales (VAS) of Mouth Pain and Dryness for Residents per Facility

<table>
<thead>
<tr>
<th>Item</th>
<th>Statistics</th>
<th>Facility A</th>
<th>Facility B</th>
<th>Facility C</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain now VAS</td>
<td>N</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>.023*</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>3.29&lt;sup&gt;b&lt;/sup&gt;</td>
<td>19.85&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.75&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.469**</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>7.53</td>
<td>31.83</td>
<td>16.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std. Error</td>
<td>1.64</td>
<td>7.12</td>
<td>3.75</td>
<td></td>
</tr>
<tr>
<td>Dry mouth VAS</td>
<td>N</td>
<td>21</td>
<td>19</td>
<td>20</td>
<td>.035*</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>23.52&lt;sup&gt;b&lt;/sup&gt;</td>
<td>48.21&lt;sup&gt;a&lt;/sup&gt;</td>
<td>24.80&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>32.39</td>
<td>36.96</td>
<td>27.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std. Error</td>
<td>7.07</td>
<td>8.48</td>
<td>6.23</td>
<td></td>
</tr>
</tbody>
</table>

* Obtained from one-way ANOVA. Means with the same superscript letter are not significantly different at the 5% level, using Duncan tests.

** Obtained from multiple regression adjusting for age, total number of teeth, chewing ability, and smoking.
DISCUSSION

Dental services in LTC require a proactive approach initiated by facility care providers. Access to care should begin with an entrance screening oral examination to identify residents requiring dental treatment in order to intervene in an appropriate time. This model of care is in agreement with Bolden et al, who suggested a definition of oral health as “the timely use of oral health services to achieve the best possible health outcome (17).”

All residents were screened upon admission to Facility C (Table I). This dental team was proactive by stressing the importance of the oral exam and scheduling a convenient appointment time for each resident. This provided opportunity for early intervention critical for residents unaware of current oral health issues. Residents from Facilities A and B were asked upon admission if they wished to see a dentist. Simply declining this exam would often result in oral health issues going unidentified and contribute to ongoing oral health deterioration.

Facility C had formalized routines for dental examinations and oral hygiene services while maintaining interdisciplinary co-operation with general health care. Access to care was advocated for the residents and dental care was properly integrated into the overall health of the patient. In this facility, dentists and hygienists were on salary. This may have alleviated some of the financial pressures associated with dental treatment, as dental procedures can take longer for residents with complex medical conditions (18).
The majority of residents that required emergent treatment, as determined by dental exam, were not actively seeking dental care. In some instances, the fact that we were doing research and informing patients about their oral health prompted the resident to pursue dental treatment. According to the ADA classification, only 12 out of 61 residents had no treatment needs (Table IX). According to each resident’s self reported need for treatment, 41 out of 61 residents reported no current need for dental treatment (Table VII). This clearly demonstrates that residents were unaware of what their treatment requirements were. Several studies have revealed that refusal of dental treatment is due to a perceived lack of treatment needs (19, 20). Additionally, residents tend to mask problems rather than admit to reliance on others (21).

The highest treatment needs were seen in Facility B. More patients in this facility also scored higher on the visual analogue scale for existing pain. These residents were often unaware that a fee-for-service dentist was present once per week or they were waiting to see the dentist. Even though access to dental care was available, implementation of this service was often ineffective.

Unfortunately, a moderately high percentage of dental treatments in LTC are emergency procedures (22). This does not suggest timely use of services. To complicate matters, oral health is not a standard component of routine medical assessment for LTC residents. Health care providers report reasons such as; the oral cavity is not their responsibility, only dentists are responsible for oral health, or patients are being seen by dentists (23).
Facility A’s treatment needs fell between the other two facilities. A fee-for-service hygienist was available every 6 weeks. For all other dental care, the resident would have to be transferred to a dental office. Family members and friends often helped to ensure the residents in this facility received appropriate medical and dental care. This process, also known as informal care, may be a response to an increase in the patient-to-service provider ratio (24). For example, this could involve a resident’s daughter ensuring basic health needs were being addressed or providing transportation to a dental office. This use of informal care is expected to decrease in the future due to a shift in population demographics as more people enter the workforce (25). An increased reliance on formal care is inevitable with the baby boomer population.

Numerous barriers to the provision of oral care in LTC have been cited in the literature. These range from financial constraints, lack of interest by the resident, indifference of nursing staff, and inadequate facilities to provide dental care (17). Dentists may be reluctant to provide treatment due to a resident’s medical condition. However, Benson et al found that the severity of a LTC resident’s medical condition had no relation to their dental attitude or receptiveness for treatment (26).

The main limitation of this study was the small sample size. This restricted the ability to adjust for potential confounders. According to logistic regression, the more income sources a resident had, the more likely the resident’s ADA classification was 1 and 2 (Table IX). Possibly, less financial constraint resulted in better access to dental services
or these residents had better care prior to entering LTC. Future studies with larger sample sizes are necessary to improve our understanding of potential confounders.

LTC facilities in Canada are not covered under the Canada Health Act. Therefore, provincial and territorial legislation govern LTC health policies. While some facilities have public funding there are many private LTC homes throughout Canada. This means that different ranges of services are provided within provinces and across the country. This diversity complicates an already challenging research environment. Part two of this study uses a qualitative analysis to explore the data with increased depth due to the limitations associated with the statistical analysis presented in this study.

Many factors are needed to improve provision of oral health in LTC oral. Interdisciplinary co-operation is fundamental to this process. Volunteer senior mentors that can help other seniors with health care information, advice, and counseling may be an effective model to increase health knowledge and behavior modification (27). Community and family need to advocate for LTC residents. Government policy must enforce minimum standards of care, establish funding, and provide equal access to oral health care for LTC residents. Members of health care community should conduct more research to identify the most effective systems for implementing care in a cost effective way. Further research is necessary to achieve evidence-based guidelines for care.
CONCLUSION

Dental services in LTC require a proactive approach directly integrated with each resident’s general health care. Passive treatment strategies fail to provide acceptable oral health for LTC residents even when dental services are available. Oral health promotion for LTC requires a collaborative approach that addresses the biologic and social factors integral to providing treatment.
REFERENCES


The Impact of Integration of Dental Services on Oral Health in Long-Term Care. Part II: Qualitative Analysis.

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ABSTRACT

Objectives: To qualitatively analyze how integration of dental service in LTC (Long-Term Care) impacts residents and their oral health.

Background: Few studies have attempted to merge inductive and deductive data to clarify the significance of the complex psychosocial environment in LTC facilities. Understanding the subjective oral health experience of LTC residents in their social setting is key to uncovering behavioral patterns that may be limiting the oral care provided to LTC residents.

Materials and methods: A cross-sectional study was performed involving 61 residents in 3 LTC facilities in Ontario. Observations and reflective notes were recorded during or immediately after a structured questionnaire and open-ended interviews with each resident. Inductive analysis was used to identify common patterns and themes within field notes and transcriptions.

Results: The major themes identified included oral hygiene, oral discomfort, general health, appearance, dental access, and denture-related issues. Oral hygiene and discomfort were the dominating categories within the facilities.

Conclusion: Two of three LTC centers identified in this study failed to provide appropriate oral care for their residents. Future research needs to be directed at prospective studies assessing the effect of oral health education and mandatory entrance dental examinations within LTC centers utilizing qualitative and quantitative analyses.
INTRODUCTION

This two-part study intends to provide a wider perspective of the data set by exploring the complex beliefs and interactions between residents that are not amenable to quantitative research alone (1). In general, qualitative research involves the study of social events through the systematic collection, organization, and interpretation of textual material. This includes data analysis from interviews, direct observations, or document analysis (2).

According to the World Health Organization, health or illness may affect an individual’s quality of life through their perceptions of “physical health, psychological state, level of independence, social relationships, and their relationships to salient features of their environment (3).” These perceptions may affect how integration of dental service in LTC affects a resident’s oral health. MacEntee used a “qualitative” case research approach to analyze what impact oral health care programs have on LTC residents. Data collected from open-ended interviews resulted in a clearer understanding of human behavior not revealed by other investigations using only structured questionnaires and interviews (4).

A concept that is fundamental to gerontology is that each person becomes more unique as they age (5). This creates highly specific treatment needs. There is a delicate balance between doing no harm, preventing harm, promoting good, and respecting an individual’s wishes. Bryant et al, investigated the views and experiences of dentists that worked with institutionalized elders to understand the influence of ethical problems encountered during treatment (6). Unclear treatment outcomes, patient wishes, and determinants of
care often resulted in compromised treatment decisions. Opposing views were held between dentists regarding optimal treatment.

Oral health and systemic health are closely interrelated. Poor oral health may have a direct impact on chewing ability, diet, communication, and body mass (7). A large component of oral disease has a behavioral aspect, therefore a thorough understanding of a LTC resident’s daily life is required to improve disease prevention. The following qualitative analysis is aimed to complement the quantitative data in part one of this study to provide insight into how integration of dental service in LTC impacts oral health.
MATERIALS AND METHODS

Data Sources

As described in part one, the principal examiner collected data from three sites. The goals of the qualitative analysis were to discover and interpret rather than hypothesis testing and generalization. Three sites were chosen with different approaches to oral health care. Facility A had a fee-for-service hygienist that attended patients at their request, Facility B had a dentist present once per week who was available at the patients’ request, and Facility C had a full time dental team where all patients underwent dental screenings. This ensured some diversity in the data set by including residents with different social backgrounds and experiences. Due to the timely process involved in analyzing each site and their residents, roughly 20 residents were chosen from each site. Initial visits to sites often involved meeting with staff, touring the facility, and deciding on the best approach to commence research while respecting the daily activities of the residents.

Residents in this study were in either LTC or complex continuing care. Figure I illustrates possible routes residents may take to the type of treatment they require.

Figure I: Conceptual Model for the Transition of a Resident from the Community to and from Institutionalized Care
Data Collection

A dental headlamp, sterile exam kits, masks, gloves, examination forms, and a digital camera were brought to each site. A liaison would direct the investigator to the selected residents in each facility. Medical charts and history were reviewed and intra-oral photos taken. Complete extra-oral and intra-oral exams were undertaken, while a care-aid recorded the data. Data collection was completed bedside or in a designated room, with the exception of Facility C which provided a dental operatory. The dental exams were physically demanding at the bedside. On average, three residents were seen during each visit.

Qualitative data was collected during administration of the oral health questionnaire (appendix III). Although this questionnaire was structured, questions that stimulated conversation or provoked thought were openly continued. This process ensured that each resident was given the same prompts to initiate conversation or express oral health concerns. Field notes and transcribed conversation were recorded during or immediately after data collection on each resident. Interactions between family-resident, care aid-resident, and resident-resident were also documented.

Qualitative data were read and reread to analyze it for patterns. Common patterns or themes were identified from field notes and transcriptions. Each theme identified was assigned a color code. The extent of each theme within the facilities was determined. The distribution of themes was then graphed by the percentage of residents in each facility demonstrating that theme.
RESULTS

The major themes identified included oral hygiene, oral discomfort, general health, appearance, dental access, and denture-related issues. Oral hygiene and discomfort were the dominating categories within the facilities (Fig. II). Specific case reports are highlighted below.

Oral Discomfort

Oral discomfort was found at all sites, but was the highest at Facilities A and B (Fig. IV). Pain was not always easy to quantify for residents. In some cases, pain could be incited with a simple percussion sensitivity test on a patient with no reported discomfort. Although a few residents in Facility C reported oral discomfort, these residents were either in the process of being treated by the dental team, being monitored, or simply refused treatment.

Denture related issues were a significant source of discomfort at Facilities A and B (Fig. III); however, Facility C had no residents with a CUD or CLD. Discomfort involved a loose fit, sore spots, chewing difficulty, food impaction, and difficulty with insertion. One resident in Facility B had no teeth and no dentures for 20 years. He reported gagging on them and adapted well with no teeth and reported no problems. Another resident had a denture with a cracked flange, complained of looseness, had a sore on his gums, and remarked, “even still, I can eat just about anything”. This demonstrates the ability of some residents to adapt to their situation in a fashion that others would likely find intolerable.
Tooth related discomfort often included sensitivity to hot, cold, or pressure. Other oral discomfort included loose fillings, dry mouth, metallic taste, and burning sensation of the tongue. Many residents employed adaptive techniques to overcome comfort difficulties. For example, gargling salt water to help with discomfort, utilizing sensodyne toothpaste to help with sensitive teeth, or just waiting until the pain goes away. One resident decided that his tooth sensitivity was “my own fault, I don’t want to bother the dentist.” Another resident went to the dentist to get help with a loose partial lower denture. The resident did not tell the dentist about pain with hot or cold foods because she was worried that the dentist would take her teeth out. The attitudes of residents towards oral care often included comments such as, “if there is no pain I don’t go to the dentist” or “if not broken leave it alone”.

**Oral hygiene**

Half of the residents in Facility C required help with oral hygiene (Fig. III). Even though nurses often provided oral hygiene, there were some residents that would complain: “I only get my teeth brushed after lunch.”; “It is hard to get brushing after supper.”; “In the morning it feels like there is acid in my mouth.”; “Some nurses do not know how to clean teeth properly.”; “Plaque builds up on the inside.”; “They do not do as good a job as I would like.”; “I used to get a thorough brushing from the dental clinic once per month, but funding got cut for that.”; “Staff do not know how to use my electric toothbrush properly.”; “I can’t get my fingers into my mouth to floss, so I do what I can with my toothbrush.”
The majority of residents in Facility A and B did not require help with brushing or flossing. Consequently, it was likely harder for the residents that required help to get it from a staff person. These residents would sometimes help one another. One resident would take care of the oral hygiene for another resident who was not capable of doing so on their own. Sometimes this would occur between friends or spouses.

Facility C had the best available oral hygiene services with many residents receiving help with daily brushing and up to six hygiene visits per year. This would be a great addition to Facilities A and B, however it was interesting to note that the residents in Facility C still had many complaints about the service. Treatment is relative to the experiences one receives in their facility, as most residents will never know what occurs at different facilities.

**General health**

General health issues often overshadowed and minimized oral health issues. Cognitive impairment and conditions that interfere with communication were significant barriers to identifying treatment needs. The medical conditions of residents in Facility A were diverse and included residents with Alzheimers, Parkinson’s, Multiple Sclerosis, amputations, depression, and Amyotrophic Lateral Sclerosis. One resident tried to commit suicide and was paralyzed from the chest down. The majority of Facility B residents were admitted due to cerebral vascular accidents and associated neurological deficits. A number of Facility C residents were quadriplegic or paraplegic.
Medical issues such as poor eyesight, limitations in movement, memory loss, aphasia, and effects of polypharmacy often created oral health difficulties. A resident with aphasia kept pointing to her front teeth. Upon examination, a large abscess in the buccal vestibule and denture stomatitis was present. Language barriers could often pose difficulty in understanding what may be bothering a resident. Another resident asked, “Can my oral health be affecting problems with my stomach”.

**Access**

Access to a dentist was not a problem at Facility C, however a number of residents in the other two facilities were waiting many weeks to see a dentist or stopped going. Transportation was a common complaint at Facility A because no dentist was accessible on-site. Reported reasons for not seeing the dentist included, “it is too inconvenient for people to take me”, “it is hard to get there because I am unwell”, “there is no access to a dentist”, and in one case the expense was too great.

**Appearance**

Appearance was commonly a concern of residents with questions regarding tooth whitening or complaints about esthetics. In one case, whitening strips had to be removed from a resident from overuse. A resident in Facility B reported not smiling due to missing top teeth.
General subjective notes/Case Reports

Patients, friends, or family providing oral care may be insufficient and misleading. In the two cases where this behavior was seen, the oral hygiene of the recipient was far worse than that of the caregiver. After showing the caregiver what was happening in the friend’s or spouse’s mouth with aid of a headlamp, they were very surprised with how much plaque and inflammation was occurring. Care-aids were often over-worked and were not comfortable performing oral hygiene for residents. When a resident asked a care-aid for help flossing, the social worker responded, “I would not know what to do, I would be worried about bleeding while flossing your teeth.”

A number of unexpected scenarios occurred during data collection. A resident of Facility B lost their dentures and the resident remarked that staff said to her “if you lost them, you find them”. While performing an oral examination in Facility B, an occupational therapist came to assess a foot ulcer on the patient. Questions in my mind included, if there was an oral ulcer would anybody come to assess it? When asking a resident in Facility A about the ability to speak clearly, she suddenly started to cry because her husband who recently died never thought she spoke clearly. One may think that a health care related occupation may have an effect on personal care, however a retired dentist in Facility B had the highest plaque levels of any resident in the study.

The working structure of each facility was greatly different. One could extrapolate that different institutions will vary widely with respect to oral health care policies depending on factors such as funding, management, and employees. A director from Facility A
reported, “In theory a hygienist visits every 6 weeks, although in reality some residents are missed or refuse to be seen.” Facility B had no preventive care, whereas Facility C residents often received up to six hygiene visits per year. Overall, 66% of residents reported not requiring dental treatment, whereas only 20% did not require treatment according to the ADA classification system. The length of time a resident was in LTC did not seem to relate to their treatment needs. This suggests that many residents enter LTC facilities with active dental requirements.
Figure II: Major Themes Identified within Facilities

Figure III: Distribution of Residents by American Dental Association Classification and Long-Term Care Facility
Figure IV: Distribution of Themes by Facility

Figure V: Mean Visual Analog Scales (VAS) of Mouth Pain and Dryness for Residents per Facility
Figure VI: Selected Intra-Oral Photos Facility A
Figure VIII: Selected Intra-Oral Photos Facility B
Figure IX: Selected Intra-Oral Photos Facility B
Figure X: Selected Intra-Oral Photos Facility C
Figure XI: Selected Intra-Oral Photos Facility C
DISCUSSION

A significant body of Canadian research surrounding oral health in long-term care has emerged from the University of British Columbia. A multiple case study by MacEntee et al was used to analyze what impact oral health care programs have on LTC residents. Data were collected from open-ended interviews. Oral health care in LTC was found to have three main components – oral health assessment, dental treatment, and daily oral hygiene (4). The mouth may be portrayed as a reflection of the aging process with general health, hygiene, and comfort playing significant roles (8). The themes identified in this study were similar, however a stronger focus was directed at oral discomfort by residents.

Quantitative and qualitative data were analyzed to help determine the direction of future research for the improvement of oral health in LTC, albeit the quantitative data are presented in a separate paper. Few studies have attempted to merge inductive and deductive data to clarify the significance of the complex psychosocial environment in LTC facilities. Medical research has shown that diversity in data analysis is required to attain a broader understanding of clinical realities (9). The subjective oral health experiences of LTC residents in their social setting was found to be equally important as the quantitative data collected in part one of this study.

One of the challenges in determining which methods of oral health care work best in LTC is that no consensus has been reached on how to evaluate LTC oral health programs. Many studies aimed at disease prevention have involved educational interventions, but
have been limited by uncertainty about the clinical measures for assessing appropriate levels of oral hygiene and comfort. Photographic documentation used in this study has provided a direct reference of a resident’s oral condition. Although difficult to quantify, the amounts of information stored in these photographs helped to recall specific conditions that are sometimes lost in numerical analyses.

Numerous indices have been developed to assess oral health in LTC, but they have not been proven as predictors for oral health (10). Beck and Hunt have noted that the presence of dental conditions is a result of disease that has accumulated over many years. Thus, the state of a patient’s oral health may have deteriorated prior to their entry into a LTC facility (11). This stresses the importance of oral examinations for residents upon entrance to LTC to stop the progression of past dental neglect.

Examiner calibration, standardization, and appropriate sampling are rarely properly addressed in LTC research (12). These challenges were clearly evident to researchers in this two-part study. Given these limitations, the combination of quantitative and qualitative data helps provide a more global view required for this environment. There appears to be as much variation within LTC facilities as there are between facilities with respect to the organization of oral health provision.

In general, most residents found the social interactions involved in this research process enjoyable. Although demanding, this implies that research can be carried out in a positive manner for the residents. Full-time salaried dentists and hygienists in a dental
Clinic within a facility are not realistic for almost all LTC centers. Facility C provided the best model for dental care, however the financial implication of other facilities utilizing such an approach is likely prohibitive. Current strategies to improve oral care in LTC need to utilize the available resources currently in place within each LTC. It may be possible for multiple LTC homes to pool financial resources to attract and share the services of dental hygienist for their facilities. Future research needs to ensure that the oral health provision based in LTC has a solid foundation in the understanding of oral health and its general health implications. The predominant players in this process are the administrators, doctors, care-aids/nurses, and residents.

**CONCLUSION**

The following statements summarize key conclusions:

1. Oral discomfort and oral hygiene were dominant themes found within each LTC facility.

2. Entrance oral examinations are fundamental to identifying treatment needs and should be a mandatory component of the entrance process to LTC.

3. Future research should be directed at the impact of education on residents, care-aids/nurses, doctors, administrators, and families on the utilization of preventive oral care programs.

4. Cost-effective ways of identifying residents that require treatment and the provision of preventive dental care need to be determined.

5. The results of this qualitative research form a framework for the development of an evidence-based questionnaire to prioritize the needs of residents and direct their care.

6. Photographic documentation should be used as frequently as possible during research trials to help document cases and educate all parties involved.
REFERENCES
### APPENDIX I: EXAMINATION DENTOGRAM

<table>
<thead>
<tr>
<th>Patient:</th>
<th>Code</th>
<th>Center</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

|          | GI   | PI    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |�
APPENDIX II: EXAMINATION FORM

Patient ___________________ Gender – M  F
DOB (Year, 2 digits) ___________________ Center ___________________
Reason for Admittance ___________________ Code ___________________

Medical Information:
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________
# of Medications: _____

Requirement of a Respirator
Yes   No

Antibiotic Requirement for Probing
Yes   No
Do you require prophylactic antibiotics prior to dental appointments
  o  If not cognitive, obtain information from chart
  o  In not known, do not probe or get medical consult

Dental History / Examination

Chief Complaint: __ Tooth Pain   __ Gum Pain           __ TMJ Pain    __ Dry Mouth
  __ Esthetics   __ No Complaints   __ Other ______________________
___________________________________________________________________________
___________________________________________________________________________

Calculus present  __ light                __   moderate          __  severe
  __ generalized      __  localized

Removable Prosthesis  __ CUD  __ CLD  __ PLD  __ PUD

Removable Prosthetic Hygiene  __ no plaque
  __ plaque visible by scraping with a blunt instrument

Check Off Any Area of Pathology / Developmental Lesion / Opportunistic Infection
  __ Throat
  __ Tongue,  __ R/L Lat Border,  __ Ventral,  __ Dorsal
  __ Insides of cheeks
  __ Floor of mouth                   ALL CLEAR_______
  __ Roof of Mouth                    Description __________________________________
  __ Lips
  __ Lymph Nodes
<table>
<thead>
<tr>
<th>Signs of Oral Cancer</th>
<th>Conditions Associated with Oral Trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of Oral Cancer</td>
<td>Angular Chelitis</td>
</tr>
<tr>
<td>Acute Ulceration</td>
<td>Epulis Fissuratum</td>
</tr>
<tr>
<td>Chronic Trauma</td>
<td>Alveolar Fibrosis</td>
</tr>
<tr>
<td>Aphthous Ulcers</td>
<td>Leukoplakia</td>
</tr>
<tr>
<td>Md Tori</td>
<td>Erythroplakia</td>
</tr>
<tr>
<td>Mx Tori</td>
<td>Fibroma</td>
</tr>
<tr>
<td>Candida Infection</td>
<td>Abscess</td>
</tr>
<tr>
<td>Sialolith / Mucocele</td>
<td>Pemphigus/Pemphigoid</td>
</tr>
</tbody>
</table>

**Check Off Classification Status and Circle Subcategory**

___ Class 1 – Individuals apparently requiring no dental treatment related to the type of examination or inspection performed.

___ Class 2 – Individuals requiring treatment but not of an urgent nature, such as:
   a. Moderate calculus
   b. Prosthetic cases not included in class 3
   c. Caries – not extensive or advanced
   d. Periodontal diseases – not extensive or advanced
   e. Other oral conditions requiring corrective or preventive measures

___ Class 3 – Individuals requiring early treatment of such conditions as:
   a. Extensive or advanced caries
   b. Extensive or advanced periodontal disease
   c. Chronic pulpal or apical infection
   d. Chronic oral infection
   e. Heavy calculus
   f. Surgical procedures required for removal of one or more teeth and other surgical procedures not included in class 4.
   g. Insufficient number of teeth for mastication

___ Class 4 – Individuals requiring emergency dental treatment, for such conditions as:
   a. Injuries
   b. Acute oral infections (pulpal and periapical abscesses, NUG, acute gingivitis, acute stomatitis, etc)
   c. Painful conditions
   d. Any oral condition which can jeopardize the health or safety of a patient.

**Additional Notes**
___ Patient is class 2, 3, or 4 but is being monitored by dental team due to medical limitations to treatment.

___ Extremely high plaque score (+lack of radiographs) limit ability to detect caries effectively.
## APPENDIX III: ORAL HEALTH QUESTIONNAIRE

**Patient** __________________

**Gender** – M    F

**DOB (Year – 2 digits)** __________________

**Center** __________________

**Reason for Admittance** __________________

**Code** __________________

### Overall Health

1. How would you describe your overall health
   - **Excellent** 1
   - **Very Good** 2
   - **Good** 3
   - **Fair** 4
   - **Poor** 5
   - **DK** 8
   - **MV** 9

### Dental Health

2. How would you describe your dental health
   - **Excellent** 1
   - **Very Good** 2
   - **Good** 3
   - **Fair** 4
   - **Poor** 5
   - **DK** 8
   - **MV** 9

3. Do you see a dentist or denture therapist (denturist)
   - Regularly (i.e. at least once a year for check ups) 1
   - From time to time for checkups 2
   - Only when I have pain or other trouble 3
   - Never 4
   - **DK** 8
   - **MV** 9

4. About how long has it been since you last visited a dentist?
   - 6 months or less 1
   - More than 6 months, but not more than 1 year ago 2
   - More than 1 year, but not more than 2 years ago 3
   - More than 2 years, but not more than 3 years ago 4
   - More than 3 years, but not more than 5 years ago 5
   - More than 5 years ago 6
   - Never have been 7
   - **DK** 8
   - **MV** 9

5. Do you feel that you are currently in need of dental treatment?
   - **Yes** 1
   - **No** 2

   If yes, how soon do you feel you need treatment?
   - Immediately 1
   - Within 6 months from now 2
   - More than 6 months from now 3
   - Currently receiving treatment 4
**Level of Mobility**

6. What is your level of mobility. (Include all that apply)

Ambulatory 1  
Bedridden 2  
Mobile with wheelchair 3  
Limitation of upper mobility 4  
Limitation of manual dexterity 5

**Oral Hygiene**

7. Do you require help brushing or flossing your teeth/denture?

Yes 1  
No 2

If you require help for brushing or flossing, who is it that helps you:

Health Care Aid 1  
Nurse 2  
Friend 3  
Family 4  
Other:__________ 5

8. If you cannot personally take care of your oral hygiene, do you feel help is available if you ask a staff person?

No, never 1  
Rarely 2  
Occasionally 3  
Yes, always 4  
DK 5  
N/A 6

9. How often do you/aid usually brush your teeth?

Once a week or less 1  
A few times a week 2  
Once or twice a day 3  
DK 8  
MV 9

10. How often do you/aid use floss on your teeth?

Once a week or less 1  
A few times a week 2  
Once or twice a day 3  
DK 8  
MV 9

11. How often do you/aid clean your dentures?

Once a week or less 1  
A few times a week 2  
Once or twice a day 3  
Not Applicable (has no dentures) 4  
DK 8  
MV 9
12. Do you/aid remove your dentures for the night?

- Every night 1
- Several times a week 2
- Once in a while 3
- Never 4
- Not Applicable 5
- DK 8
- MV 9

13. How long has it been since you had your teeth cleaned by a dentist or dental hygienist?

- Within the past year (anytime less than 12 months ago) 1
- Within the past 2 years (1 year but less than 2 years ago) 2
- Within the past 5 years (2 years but less than 5 years ago) 3
- 5 or more years ago 4
- DK/Not sure 5
- Never 6
- Refused 7

**Chewing Ability/Appearance/Function**

14. Are you ordinarily able to...

- Yes 1
- No 2
- DK 8
- MV 9

- a) chew a piece of fresh carrot 1
- b) chew boiled vegetables 1
- c) chew fresh lettuce salad 1
- d) chew firm meat such as steaks or chops 1
- e) bite off apple and chew a piece from a whole fresh apple 1
- f) chew hamburger 1

15. How satisfied are you with:

- Very Sat 1
- Satis 2
- Dis 3
- Very Dis 4
- DK 8
- MV 9

- a) the appearance of your teeth and/or dentures 1
- b) your ability to chew 1
- c) your ability to speak clearly 1

16. If you do not see a dentist, why do you choose not to see one?

- No access 1
- Afraid 2
- Too costly 3
- Nothing hurts 4
- Nothing wrong 5
- Not interested 6
- Unwell 7
- DK 8
- MV 9

17. During the past year, how often have pain, discomfort or other problems with your teeth, mouth or dentures cause you to:

- Always 1
- Very Often 2
- Fairly Often 3
- Sometimes 4
- Never 5
- DK 8
- MV 9

- a) Have difficulty sleeping 1
- b) Stay in home more than usual 1
- c) Stay in bed more than usual 1
- e) Be unable to do household chores 1
- f) Avoid your usual leisure activities 1
- g) Take or use medication 1
Pain/Dryness
18. In the last FOUR WEEKS have you had any of the following problems
   [For each condition, if response is YES, ask and code for the following 2 questions]

   18.1 How Severe was/is the pain or discomfort? Was it:

<table>
<thead>
<tr>
<th>Mild</th>
<th>Discomforting</th>
<th>Moderately severe</th>
<th>Severe</th>
<th>Very severe</th>
<th>DK</th>
<th>MV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

   18.2 Did you seek professional help (dentist, doctor) to treat this problem?

<table>
<thead>
<tr>
<th>Problem</th>
<th>No</th>
<th>DK=8 MV=9</th>
<th>Yes</th>
<th>Severity</th>
<th>Self-care</th>
<th>Code as above</th>
<th>Yes</th>
<th>No</th>
<th>DK=8 MV=9</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. toothache</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. pain in teeth with hot/cold foods/fluids</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. pain in teeth with sweet foods</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. pain in jaw joint while chewing</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. pain in jaw joint when opening wide</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. pain in face in front of ear</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. burning sensitivity in tongue or other parts of mouth</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. shooting pains in face or cheek</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
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<tr>
<td>i. pain or discomfort from denture</td>
<td>1</td>
<td>8/9</td>
<td>2</td>
<td>_____</td>
<td>1</td>
<td>2</td>
<td>8/9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Visual Analogue Scales 19-21 – Please have patient draw a line that intersects scale below the question. Help patient answer if they are unable to answer on their own. Point to area, mark, and confirm.

19. How much pain do you have with your teeth/mouth now.

None  -----------------------------------------------Extreme

20. How much pain do you have with your teeth/mouth when you eat

None  -----------------------------------------------Extreme

21. How dry is your mouth

Not Dry  -----------------------------------------------Extremely Dry

22. If there is dryness, what do you do to stop the dryness

  Sip water  1
  Sip juice  2
  Use dental product (eg Biotene)  3
  Nothing  4
  Other  5
  Describe __________________________

Smoking Questionnaire

1. Do you smoke cigarettes now?
   1 = yes, regularly  Go to 2, 6
   2 = no  Go to 4.
   3 = occasionally  Go to 3, 4

2. On average, how many cigarettes do you smoke a day?
   Number:

3. On how many days a week do you smoke cigarettes?
   1 = usually on one day or less
   2 = usually on 2 to 4 days
   3 = almost every day

4. Did you ever smoke cigarettes regularly in the past?
   1 = yes  Go to 5, 6.
   2 = no

5. When did you stop smoking cigarettes regularly?  Year ________
   If in the last 12 months
   1 = less than 1 month ago
   2 = 1-6 months ago
   3 = 6-12 months ago

6. How old were you when you began to smoke cigarettes regularly?  Age ________

Questions Regarding Previous Employment, Education, and Current Source of Funding
1. Do you have any kind of government or private dental insurance plan that pays for any of your regular dental care?
   1. No
   2. Yes, part
   3. Yes, all
   4. Don't know

2. Are you or a family member able to cover your dental expenses
   1. Yes
   2. No
   3. Part
   4. DK
   5. MV

3. How would you describe your previous occupation
   1. Professional
   2. Business owner
   3. Managerial/technical
   4. Skilled Manual Labour
   5. Unskilled Manual Labour
   6. No previous occupation
   7. Homemaker
   8. Other _______________________

4. What is your level of education
   1. Highschool or less
   2. Some Technical School/University
   3. Completed Technical School/University
   4. BA, BSc or Equivalent
   5. Completed Higher University Masters, PhD, Doctor etc
   6. None

5. What is your main source of income?
   1. Dividends or interest (eg, stocks, bonds, GICs)
   2. Benefits from Canada Pension Plan
   3. Retirement pensions, superannuation or annuities
   4. Old age securities and GIS supplement (guaranteed income supplement)
   5. Worker's compensation
   6. Other, for example, rental income
   7. Describe ________________________